APRIL/MAY 2023

GEPH24C/DEPH24C — NON-LINEAR OPTICS

Time : Three hours

Maximum : 75 marks

SECTION A — (10 × 2 = 20 marks)

Answer ALL questions.

1. Name two solid state lasers.

2. Name two applications of Argon ion laser.

3. What is terahertz radiation?

4. What are anisotropic crystals?

5. What is electro-optic effect?

6. What do you understand by the term "intensity dependent refractive index"?

7. Name two semiorganic nonlinear optical materials.

8. What is the chemical formula of nitroaniline?

9. Define numerical aperture.

10. What are leaky modes?

SECTION B — (5 × 5 = 25 marks)

Answer ALL questions.

11. (a) Write a short note on Nd-Yag laser.

Or

(b) Compare solid state laser with gas lasers.

12. (a) Discuss in detail sum and frequency generation.

Or

(b) Discuss the concept of phase matching.

13. (a) Write a short note on stimulated Raman scattering.

Or

(b) Write a short note on three photon process.

14. (a) Write a short note on organic non linear optical materials.

Or

(b) Explain why borates are good nonlinear optical materials.

15. (a) Compare step index and graded index fiber.

Or

(b) Discuss absorption losses in an optical fiber.

SECTION C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Explain the construction and working of He-Ne laser with the help of diagrams.

17. Discuss the response of polarisation to the electric field. Explain second harmonic and third harmonic generation with the help of equations.

18. Explain the theory of the two photon process. Describe an experiment to demonstrate the same.

19. Discuss the various mechanisms that determine laser induced surface damage threshold.

20. Derive equations for two propagation inside optical fiber.
